Petition For Revival Of An Application For Patent Abandoned Unintentionally Under 37 CFR 1.137(b) (Large Entity)	Docket No.

In Re Application Of:
BRIAN D. MORRISON, et al

Application No.	Filing Date	Examiner	Customer No.	Group Art Unit	Confirmation No.
10/624,442	07/22/2003		23984		6413

Invention:

ELECTRO-STATICALLY-SHIELDED PROCESSING MODULE

Attention: Office of Petitions
Mail Stop Petition
COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, VA 22313-1450

NOTE: If information or assistance is needed in completing this form, please contact Petitions Information at (703) 305-9282.

The above-identified application became abandoned for failure to file a timely and proper response to a notice or action by the Patent and Trademark Office. The date of abandonment is the day after the expiration date of the period set for reply in the Office notice or action plus any extension of time actually obtained.

APPLICANT HEREBY PETITIONS FOR REVIVAL OF THIS APPLICATION

NOTE: A grantable petition requires the following items:
(1) Petition fee;
(2) Reply and/or issue fee;
(3) Terminal disclaimer with disclaimer fee--required for all utility and plant applications filed before June 8, 1995; and for all design applications; and
(4) Statement that the entire delay was unintentional.

1. ☒ A proposed reply to the above-identified notice or action:

   ☒ is enclosed. ☐ was filed on _____

   The proposed reply is in the form of: **SEE ATTACHED**

2. ☐ The issue fee:

   ☐ is enclosed. ☐ was paid on _____

3. ☐ The abandoned application was a:

   ☐ design application. ☒ utility application. ☐ plant application.

4. ☐ A terminal disclaimer (and fee) disclaiming a period equivalent to the period of abandonment is enclosed.

5. ☐ Since this utility/plant application was filed on or after June 8, 1995, no terminal disclaimer is required.

12/21/2004 AWONDAF1 00000013 160325 10624442
01 FC:1453 1500.00 DA

Petition For Revival Of An Application For Patent Abandoned Unintentionally Under 37 CFR 1.137(b) (Large Entity)	Docket No.

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10/624,442	07/22/2003		23984		6413

Invention:

ELECTRO-STATICALLY-SHIELDED PROCESSING MODULE

Calculation and Payment of Fees

Enclosed are the following fees:

6. ☒	Petition fee under 37 CFR 1.17(m) in the amount of:	**$1,370.00**
7. ☐	Fee for amendment in the amount of:	
8. ☐	Fee for extension of time to respond to Office Action in the amount of:	
9. ☐	Issue fee in the amount of:	
10. ☐	Continuing application filing fee in the amount of:	
11. ☐	Terminal disclaimer fee in the amount of:	
12. ☐	_____	
	Total fees enclosed:	**$1,370.00**

The fee of **$1,370** is to be paid as follows:

☐ A check in the amount of the fee is enclosed.

☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account No. **16-0325**

☐ Payment by credit card. Form PTO-2038 is attached.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

Petition For Revival Of An Application For Patent Abandoned Unintentionally Under 37 CFR 1.137(b) (Large Entity)	Docket No.

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10/624,442	07/22/2003		23984		6413

Invention:

ELECTRO-STATICALLY-SHIELDED PROCESSING MODULE

Statement

The entire delay in filing the required reply from the due date for the required reply until the filing of a grantable petition under 37 CFR 1.137(b) was unintentional.

Signature

Dated: **December 16, 2004**

JOHN A. MOLNAR, JR.
Reg. No. 36,611
Parker-Hannifin Corporation
6035 Parkland Boulevard
Cleveland, Ohio 44124-4141
Phone: 216-896-2212
Fax: 216-896-4027

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to "Mail Stop Petition, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)] on

12/16/2004
(Date)

Signature of Person Mailing Correspondence

JANET M. NARDUZZI

Typed or Printed Name of Person Mailing Correspondence

cc:

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	10//624,442
Applicant	:	Brian D. Morrison, et al
Filed:	:	July 22, 2003
Title	:	Electro-Statically-Shielded Processing Module
Confirmation No.	:	6413

MAIL STOP PETITIONS
COMMISSIONER FOR PATENTS
P. O. BOX 1450
ALEXANDRIA VA 22313-1450

PETITION REVIVE UNDER
37 C.F.R. § 1.137(b)

This is a petition for revival of the within application under 37 C.F.R. § 1.137(b). As will be apparent from the statement below and from the exhibits attached hereto, the abandonment of this application was unintentional and revival thereof is respectfully requested.

Applicant represents that on January 16, 2004 a Power of Attorney and Revocation of Attorney, together with the Statement Under 37 C.F.R. § 3.73(b) (attached as Exhibit A) was filed in the U.S. Patent Office revoking power to Foley, Hoag & Eliot, LLP and Pepe & Hazard, LLP to John A. Molnar, Jr. of Parker-Hannifin Corporation, as a result of Confirmatory Assignment of Patent Rights from CBL Systems, LLC to Parker-Hannifin Corporation, dated November 6, 2003. A copy of the return postcard from the U.S. Patent Office is also attached hereto ax Exhibit B.

Applicant further represents that on November 8, 2004 Pepe & Hazard forwarded, by facsimile, to John Molnar (counsel for Parker-Hannifin Corporation) a copy of the Notice of Abandonment that was mailed November 4, 2004 to Pepe & Hazard for failure to reply to the Notice to File Missing Parts mailed on December 2, 2003 to Foley Hoag, LLP, relative to the within application (a copy of which is attached hereto as Exhibit C).

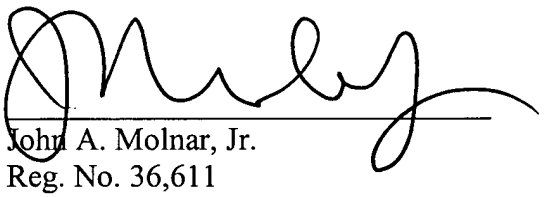
On November 22, 2004, in response to a call to the Customer Service Department of the U.S. Patent Office, a copy of the Notice to File Missing Parts was transmitted by facsimile to John Molnar (a copy of which is attached hereto as Exhibit D). Said Notice indicated that the statutory basic filing fee and executed Declaration were required along with a copy of the

specification in proper format. By this Petition, Applicant respectfully encloses the executed Declaration from prior application Serial No. 09/330,405 of which this application is a continuation, together with the specification in proper format, together with the fee required under 37 C.F.R. § 1.137(b).

Please charge Deposit Account No. 16-0325 in the amount of $1370.00. The Commissioners is hereby authorized to charge payment of this amount or any underpayment or corrected calculation of this amount or other fee associated with this communication or credit any overpayment to Deposit Account No. 16-0325. Two copies of this sheet are attached.

Should there by any questions that would aid in the revival of the within application, please feel free to contact the undersigned attorney.

Respectfully submitted,



John A. Molnar, Jr.
Reg. No. 36,611
PARKER-HANNIFIN CORPORATION
6035 Parkland Boulevard
Cleveland, Ohio 44124-4141
Telephone: (216) 896-2212
Fax: (216) 896-4027

Dated: December 16, 2004

EXHIBIT A

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

POWER OF ATTORNEY

Docket No.

Name of Applicant: **Brian D. Morrison, et al**
Address of Applicant:

Title: **Electro-Statically-Shielded Processing Module**

Serial No., if Any: **10/624,442**
Filed: **July 22, 2003**

TO THE COMMISSIONER FOR PATENTS

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Honorable Sir:
I hereby appoint:

JOHN A. MOLNAR, JR, Reg. 36,611
CHRISTOPHER H. HUNTER, Reg. No. 34,187
JOSEPH J. POPHAL, Reg. No. 42,083
JAMES A. BAKER, Reg. No. 25,131
all of
Parker-Hannifin Corporation
6035 Parkland Boulevard
Cleveland, Ohio 44124-4141

as principal attorneys to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

Please direct all future correspondence to:

JOHN A. MOLNAR, JR.
Parker-Hannifin Corporation
6035 Parkland Boulevard
Cleveland, Ohio 44124-4141
Phone: 216-896-2212
Fax: 216-896-4027
e-mail: jmolnar@parker.com

By: _____

JAMES A. BAKER
Assistant Secretary

Dated: **January 14, 2004**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

REVOCATION OF POWER OF ATTORNEY

Docket No.

Name of Applicant: **Brian D. Morrison, et al**
Address of Applicant:

Title: **Electro-Statically-Shielded Processing Module**

Serial No., if Any: **10/624,442**
Filed: **July 22, 2003**

TO THE COMMISSIONER FOR PATENTS

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Honorable Sir:

I hereby revoke the Power of Attorney given to:

FOLEY, HOAG & ELIOT LLP
One Post Office Square
Boston, Massachusetts 02109

PEPE & HAZARD LLP
225 Asylum Street
Hartford, Connecticut 06103

Dated: **January 14, 2004**

By: _____

James A. Baker
Assistant Secretary
Parker-Hannifin Corporation
6035 Parkland Boulevard
Cleveland, Ohio 44124-4141

PTO/SB/96 (08-03)
Approved for use through 07/31/2006. OMB 0651-0031
Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: **Brian D. Morrison, et al**

Application No./Patent No.: **10/624,442** Filed/Issue Date: **July 22, 2003**

Entitled: **Electro-Statically-Shielded Processing Module**

Parker-Hannifin Corporation, a **Corporation**,

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

1. [☑] the assignee of the entire right, title, and interest; or

2. [ ] an assignee of less than the entire right, title and interest.
The extent (by, percentage) of its ownership interest is _____ %
in the patent application/patent identified above by virtue of either:

A. [ ] An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

OR

B. [☑] A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as shown below:

1. From: Morrion & Connolly To: Raytheon Company
The document was recorded in the United States Patent and Trademark Office at
Reel 010107, Frame 0280, or for which a copy thereof is attached.

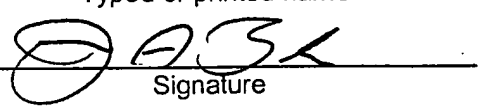
2. From: Raytheon Company To: CBL Systems Corporation
The document was recorded in the United States Patent and Trademark Office at
Reel 014182, Frame 0137, or for which a copy thereof is attached.

3. From: CBL Systems Corporation To: CBL Systems, LLC
The document was recorded in the United States Patent and Trademark Office at
Reel 014194, Frame 0817, or for which a copy thereof is attached.

[☑] Additional documents in the chain of title are listed on a supplemental sheet.

[ ] Copies of assignments or other documents in the chain of title are attached.
[NOTE: A separate copy (*i.e.*, the original assignment document or a true copy of the original document) must be submitted to Assignment Division in accordance with 37 CFR Part 3, if the assignment is to be recorded in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

January 14, 2003	JAMES A. BAKER
Date	Typed or printed name
(216) 896-2138	
Telephone number	Signature
	Assistant Secretary
	Title

Supplemental Statement Under 37 CFR 3.73(b)

Chain of title continued:

4. From CBL Systems LLC to Parker-Hannifin Corporation dated November 6, 2003.

07204/084001

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
ASSISTANT SECRETARY AND COMMISSIONER
OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

101099617A

SEPTEMBER 23, 1999

FISH & RICHARDSON P.C.
RICHARD M. SHARKANSKY
225 FRANKLIN STREET
BOSTON, MA 02110-2804

UNITED STATES PATENT AND TRADEMARK OFFICE
NOTICE OF RECORDATION OF ASSIGNMENT DOCUMENT

THE ENCLOSED DOCUMENT HAS BEEN RECORDED BY THE ASSIGNMENT DIVISION OF THE U.S. PATENT AND TRADEMARK OFFICE. A COMPLETE MICROFILM COPY IS AVAILABLE AT THE ASSIGNMENT SEARCH ROOM ON THE REEL AND FRAME NUMBER REFERENCED BELOW.

PLEASE REVIEW ALL INFORMATION CONTAINED ON THIS NOTICE. THE INFORMATION CONTAINED ON THIS RECORDATION NOTICE REFLECTS THE DATA PRESENT IN THE PATENT AND TRADEMARK ASSIGNMENT SYSTEM. IF YOU SHOULD FIND ANY ERRORS OR HAVE QUESTIONS CONCERNING THIS NOTICE, YOU MAY CONTACT THE EMPLOYEE WHOSE NAME APPEARS ON THIS NOTICE AT 703-308-9723. PLEASE SEND REQUEST FOR CORRECTION TO: U.S. PATENT AND TRADEMARK OFFICE, ASSIGNMENT DIVISION, BOX ASSIGNMENTS, CG-4, 1213 JEFFERSON DAVIS HWY, SUITE 320, WASHINGTON, D.C. 20231.

RECORDATION DATE: 07/21/1999

REEL/FRAME: 010107/0280
NUMBER OF PAGES: 3

BRIEF: ASSIGNMENT OF ASSIGNOR'S INTEREST (SEE DOCUMENT FOR DETAILS).

ASSIGNOR:
MORRISON, BRIAN D.

DOC DATE: 07/12/1999

ASSIGNOR:
CONNOLLY, PAUL A.

DOC DATE: 07/12/1999

ASSIGNEE:
RAYTHEON COMPANY
141 SPRING STREET
LEXINGTON, MASSACHUSETTS 02421

SERIAL NUMBER: 09330405
PATENT NUMBER:

FILING DATE: 06/11/1999
ISSUE DATE:

SHARON LATIMER, EXAMINER
ASSIGNMENT DIVISION
OFFICE OF PUBLIC RECORDS

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
ASSISTANT SECRETARY AND COMMISSIONER
OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

700055836A

DECEMBER 09, 2003

PTAS

PARKER-HANNIFIN CORP.
JOHN A. MOLNAR, JR.
6035 PARKLAND BLVD.
CLEVELAND, OH 44124-4141

UNITED STATES PATENT AND TRADEMARK OFFICE
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THE ENCLOSED DOCUMENT HAS BEEN RECORDED BY THE ASSIGNMENT DIVISION OF THE U.S. PATENT AND TRADEMARK OFFICE. A COMPLETE MICROFILM COPY IS AVAILABLE AT THE ASSIGNMENT SEARCH ROOM ON THE REEL AND FRAME NUMBER REFERENCED BELOW.

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RECORDATION DATE: 12/09/2003

REEL/FRAME: 014182/0137
NUMBER OF PAGES: 3

BRIEF: ASSIGNMENT OF ASSIGNOR'S INTEREST (SEE DOCUMENT FOR DETAILS).

ASSIGNOR:
RAYTHEON COMPANY

DOC DATE: 10/06/2000

ASSIGNEE:
CBL SYSTEMS CORPORATION
25 SOUTH STREET
HOPKINTON, MASSACHUSETTS 01748

SERIAL NUMBER: 10039044
PATENT NUMBER: 6600972

FILING DATE: 01/03/2002
ISSUE DATE: 07/29/2003

SERIAL NUMBER: 10624442
PATENT NUMBER:

FILING DATE: 07/22/2003
ISSUE DATE:

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
ASSISTANT SECRETARY AND COMMISSIONER
OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

700056698A

DECEMBER 15, 2003

PTAS

PARKER-HANNIFIN CORPORATION
JOHN A. MOLNAR
6035 PARKLAND BOULEVARD
CLEVELAND, OH 44124-4141

UNITED STATES PATENT AND TRADEMARK OFFICE
NOTICE OF RECORDATION OF ASSIGNMENT DOCUMENT

THE ENCLOSED DOCUMENT HAS BEEN RECORDED BY THE ASSIGNMENT DIVISION OF THE U.S. PATENT AND TRADEMARK OFFICE. A COMPLETE MICROFILM COPY IS AVAILABLE AT THE ASSIGNMENT SEARCH ROOM ON THE REEL AND FRAME NUMBER REFERENCED BELOW.

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RECORDATION DATE: 12/15/2003 REEL/FRAME: 014194/0817
NUMBER OF PAGES: 4

BRIEF: ASSIGNMENT OF ASSIGNOR'S INTEREST (SEE DOCUMENT FOR DETAILS).

ASSIGNOR:
CBL SYSTEMS CORPORATION DOC DATE: 07/22/2003

ASSIGNEE:
CBL SYSTEMS, LLC
TECHNIPOWER LLC
14 COMMERCE DRIVE
DANBURY, CONNECTICUT 06810

SERIAL NUMBER: 10624442 FILING DATE: 07/22/2003
PATENT NUMBER: ISSUE DATE:

JEFFREY OLSEN, EXAMINER
ASSIGNMENT DIVISION
OFFICE OF PUBLIC RECORDS

CONFIRMATORY ASSIGNMENT OF PATENT RIGHTS

CBL Systems LLC, a Delaware limited liability company ("Assignor"), hereby acknowledges that pursuant to the Asset Purchase Agreement by and among Assignor and Parker Hannifin Corporation, an Ohio corporation, its successors and assigns, (herein referred to as "Assignee") executed November 6, 2003 (herein referred to as the "Purchase Agreement"), Assignor, for good and valuable consideration, the receipt of which is hereby acknowledged, sold, assigned, transferred, and set over, unto Assignee, Assignor's entire right, title, and interest in, to and under the patents and patent applications identified in the Attachment hereto, all patents and patent applications (U.S. and foreign) claiming filing priority thereto, including all divisions, continuations, renewals, substitutes, reissues, reexaminations, and extensions thereof, and the invention(s) set forth therein, and any and all claims, demands, causes of action, damages and remedies of every kind recoverable at law or in equity or otherwise from any and every party for any and every infringement of such patents and patent applications together with the rights to bring and maintain any action for past infringements and for the recovery of damages and fees.

Assignor agrees that Assignee may record this Confirmatory Assignment in the U.S. Patent & Trademark Office and other patent offices, where it will be open for public inspection.

CBL SYSTEMS LLC

Date: 11/6/03

By: _____

Name: John Thomas
Its: Vice President

COMMONWEALTH OF MASSACHUSETTS)
) SS:
COUNTY OF SUFFOLK)

On this 6 day of November, 2003, before me personally appeared John Thomas to me known, who, being by me duly sworn, did depose and say that he is Vice President of CBL Systems LLC, the limited liability described in and which executed the foregoing instrument, that said instrument was executed with authorization by the managers of said limited liability company, and that he signed his name thereto by like authorization.

_____

Notary Public NEALE.SPLAINE
My Commission Expires: 11/13/04

CBC/32324/4/652417v2
11/03/03-HRT/

ATTACHMENT TO:
CONFIRMATORY ASSIGNMENT OF PATENT RIGHTS

1. U.S. Letters Patent No. 5,706,278 granted January 6, 1998 for "Deterministic Network Protocol".

Foreign Equivalents
European Patent No. 0755137 granted January 22, 1997

Validated Countries:	Patent Number:
France	0755137
Germany	69618395
Italy	0755137
Netherlands	0755137
United Kingdom	0755137

Japanese Patent Application No. 192512/96

2. U.S. Letters Patent No. 5,796,935 granted August 18, 1998 for "Voting Node For A Fault Tolerant Distributed Control System".

Foreign Equivalents
European Patent No. 0754990 granted November 8, 2000

Validated Countries:	Patent Number:
France	0754990
Germany	69610877
Italy	0754990
Netherlands	0754990
United Kingdom	0754990

Japanese Patent Application No. 192519/96

3. U.S. Letters Patent No. 5,809,220 granted September 15, 1998 for "Fault Tolerant Distributed Control System".

Foreign Equivalents
European Patent No. 0754991 granted September 15, 1999

Validated Countries:	Patent Number:
Germany	69604249
Netherlands	0754991
United Kingdom	0754991

Japanese Patent Application No. 192515/96

4. U.S. Letters Patent No. 6,062,739 granted May 16, 2000 for "Fiber Optic Connector".

No Foreign Equivalents

5. U.S. Letters Patent No. 6,356,809 granted March 12, 2002 for "Electro-statically Shielded Processing Module".

Foreign Equivalents
PCT Application No. 200077638 filed June 9, 2000 (now completed)
Canadian Patent Application No. 2,376,737
China Patent Application No. 00811411.0
European Patent Application No. 1208431
Japanese Patent Application No. 2001-503054
Korean Patent Application No. 10-7015961

Continuations
U.S. Letters Patent No. 6,600,972 granted July 29, 2003 for "Electro-statically Shielded Processing Module." This is a continuation of Patent No. 6,356,809.
U.S. Patent Application No. 10/624,442 filed on July 22, 2003 for "Electro-statically Shielded Processing Module". This is a continuation of Patent No. 6,600,972.

6. U.S. Patent Application No. 10/373,283 filed on February 24, 2003 for "Optical Connector."

Foreign Equivalents
PCT Application No. PCT/US03/05249 filed on February 24, 2003 designating all PCT member countries including the U.S. This Patent Application was filed concurrently with U.S. Patent Application No. 10/373,283.

7. U.S. Patent Application No. 10/373,272 filed on February 24, 2003 for "Optical Ring Architecture."

Foreign Equivalents
PCT Application No. PCT/US03/05248 filed on February 24, 2003 designating all PCT member countries including the U.S. This Patent Application was filed concurrently with U.S. Patent Application No. 10/373,272.

al Property

(a) 1. U.S. Letters Patent No. 5,706,278 granted January 6, 1998 for "Determinist ic Network Protocol".

Foreign Equivalents

European Patent No. 0755137 granted January 22, 1997

Validated Countries:	Patent Number:
France	0755137
Germany	69618395
Italy	0755137
Netherlands	0755137
United Kingdom	0755137

Japanese Patent Application No. 192512/96

2. U.S. Letters Patent No. 5,796,935 granted August 18, 1998 for "Voting Node For A Fault Tolerant Distributed Control System".

Foreign Equivalents

European Patent No. 0754990 granted November 8, 2000

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France	0754990
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Italy	0754990
Netherlands	0754990
United Kingdom	0754990

Japanese Patent Application No. 192519/96

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Foreign Equivalents

European Patent No. 0754991 granted September 15, 1999

Validated Countries:	Patent Number:
Germany	69604249
Netherlands	0754991
United Kingdom	0754991

Japanese Patent Application No. 192515/96

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No Foreign Equivalents

5. U.S. Letters Patent No. 6,356,809 granted March 12, 2002 for "Electro-stat ically Shielded Processing Module".

Foreign Equivalents
PCT Application No. 200077638 filed June 9, 2000 (now completed)
Canadian Patent Application No. 2,376,737
China Patent Application No. 00811411.0
European Patent Application No. 1208431
Japanese Patent Application No. 2001-503054
Korean Patent Application No. 10-7015961

Continuations
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Foreign Equivalents
PCT Application No. PCT/US03/05248 filed on February 24, 2003 designating all PCT member countries including the U.S. This Patent Application was filed concurrently with U.S. Patent Application No. 10/373,272.

(b) None.

(c) None.

EXHIBIT B

Will the Patent and Trademark Office kindly stamp and return the within postcard as an indication that the accompanying documents have been received:

Applicant: Brian D. Morrison, et al
Serial No.: 10/624,442
Title: Electro-Statically-Shielded Processing Module
Filed: July 22,2003
Documents Transmitted: Revocation of Power of Attorney
Power of Attorney
Statement Under 37 CFR 3.73(b)

EXHIBIT C

PEPE & HAZARD
Law Offices
225 ASYLUM STREET
HARTFORD, CONNECTICUT 06103-4302
TELEPHONE: (860) 522-5175
FAX: (860) 522-2796

MULTI-PARTY FAX COVER SHEET

DATE: 11-8-04 TIME: _____ CLIENT/MATTER 32324-4

PLEASE DELIVER THIS FAX IMMEDIATELY:

TO:	FIRM:	FAX NUMBER:
John Molnar		216-896-4027
Neal Splaine		

FROM: Peter Costas

Message: _____

Description of Document: _____

PLEASE NOTE!!

PEPE & HAZARD LLP
A Business Law Firm

225 ASYLUM STREET
HARTFORD, CONNECTICUT 06103-4302
860/522-5175 FACSIMILE 860/522-2796
www.pepehazard.com

PETER L. COSTAS
Attorney At Law
‡Also Admitted in New York
Direct: 860.241.2630
pcostas@pepehazard.com

November 8, 2004

BY FACSIMILE (216-896-4027)

John A. Molnar, Jr., Esq.
Parker-Hannifin Corporation
6035 Parkland Boulevard
Cleveland OH 44124

Dear John:

CBL Systems
Our File - 32324-4

Enclosed you will find a copy of two documents which we received from the Patent Office, namely a notice regarding change of power of attorney of our firm as attorneys in connection with Patent Application Serial No. 10/624,442, and, more importantly, a notice of abandonment of that application. This is one of the files which we forwarded to you with our letter of November 6, 2003.

I would appreciate your advice as to what happened.

Very truly yours,

Peter L. Costas

PLC:jas
Enclosure
Cc: Neal Splaine, Esq.

PLC/32324/4/701270v1
11/08/04-HRT/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
10/624,442	07/22/2003	Brian D. Morrison	CLK-002.03 (22046-203)

CONFIRMATION NO. 6413

PEPE & HAZARD LLP
225 Asylum Street
Hartford, CT 06103

ABANDONMENT/TERMINATION LETTER

OC000000014282082

Date Mailed: 11/04/2004

NOTICE OF ABANDONMENT UNDER 37 CFR 1.53 (f) OR (g)

The above-identified application is abandoned for failure to timely or properly reply to the Notice to File Missing Parts (Notice) mailed on 12/02/2003.

- No reply was received.

A petition to the Commissioner under 37 CFR 1.137 may be filed requesting that the application be revived.

Under 37 CFR 1.137(a), a petition requesting the application be revived on the grounds of **UNAVOIDABLE DELAY** must be filed promptly after the applicant becomes aware of the abandonment and such petition must be accompanied by: (1) an adequate showing of the cause of unavoidable delay; (2) the required reply to the above-identified Notice; (3) the petition fee set forth in 37 CFR 1.17(l); and (4) a terminal disclaimer if required by 37 CFR 1.137(d).

Under 37 CFR 1.137(b), a petition requesting the application be revived on the grounds of **UNINTENTIONAL DELAY** must be filed promptly after applicant becomes aware of the abandonment and such petition must be accompanied by: (1) a statement that the entire delay was unintentional; (2) the required reply to the above-identified Notice; (3) the petition fee set forth in 37 CFR 1.17(m); and (4) a terminal disclaimer if required by 37 CFR 1.137(d).

Any questions concerning petitions to revive should be directed to the "Office of Petitions" at (703) 305-9282. Petitions should be mailed to: Mail Stop Petitions, Commissioner for Patents, P.O. Box 1450, Alexandria VA 22313-1450.

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*A copy of this notice **MUST** be returned with the reply.*

RJB

Customer Service Center
Initial Patent Examination Division (703) 308-1202
PART I - ATTORNEY/APPLICANT COPY

NOV 8 2004

Notice of Abandonment

This application is abandoned in view of applicant's failure to timely file a proper reply to the Office notice mailed on 12/02/03.

Petition to Withdraw the Holding of Abandonment

If a complete reply to the notice was previously filed by applicant within the time period set forth in the notice, applicant may request for reconsideration of the holding of abandonment within 2 months from the mailing of this notice of abandonment by filing a petition to withdraw the holding of abandonment under 37 CFR 1.181(a). No petition fee is required. The petition must be accompanied by a true copy of the originally filed reply and the item(s) identified in one of the following:

1. A properly itemized date-stamped postcard receipt (see MPEP § 503),
2. If the originally filed reply included a certificate of mailing or transmission in compliance with 37 CFR 1.8(a), a copy of the certificate of mailing or transmission and a statement in compliance with 37 CFR 1.8(b) (see MPEP § 512); or
3. If the reply was filed via Express Mail, a submission satisfying the requirements of 37 CFR 1.10(e) including, for example, a copy of the Express Mail mailing label showing the "date-in" (see MPEP § 513).

Any petition to withdraw the holding of abandonment should be transmitted by facsimile directly to OIPE Customer Service at (703) 308-7751.

Petition to Revive an Abandoned Application

If applicant did not previously file a complete reply within the time period set forth in the notice, applicant may file a petition to revive the application under 37 CFR 1.137.

Under 37 CFR 1.137(a), a petition requesting the application be revived on the grounds of UNAVOIDABLE DELAY must be filed promptly after the applicant becomes aware of the abandonment and such petition must be accompanied by:

1. an adequate showing of the cause of unavoidable delay;
2. the required reply to the above-identified notice;
3. the petition fee set forth in 37 CFR 1.17(i); and
4. a terminal disclaimer if required by 37 CFR 1.137(d).

See MPEP § 711.03(c) and Form PTO/SB/61.

Under 37 CFR 1.137(b), a petition requesting the application be revived on the grounds of UNINTENTIONAL DELAY must be filed promptly after applicant becomes aware of the abandonment and such petition must be accompanied by:

1. a statement that the entire delay was unintentional;
2. the required reply to the above-identified notice;
3. the petition fee set forth in 37 CFR 1.17(m); and
4. a terminal disclaimer if required by 37 CFR 1.137(d).

See MPEP § 711.03(c) and Form PTO/SB/64.

Any questions concerning petitions to revive should be directed to Office of Petitions at (703) 305-9282.

Any questions regarding this notice should be directed to OIPE Customer Service at (703) 308-1202

Customer Service Center
Initial Patent Examination Division (703) 308-1202

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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Alexandria, Virginia 22313-1450
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APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
10/624,442	07/22/2003	Brian D. Morrison	CLK-002.03 (22046-203)

CONFIRMATION NO. 6413

25181
FOLEY HOAG, LLP
PATENT GROUP, WORLD TRADE CENTER WEST
155 SEAPORT BLVD
BOSTON, MA 02110

OC000000014273650
OC000000014273650

Date Mailed: 11/03/2004

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 01/16/2004.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

PEPE & HAZARD LLP
225 Asylum Street
Hartford, CT 06103

MARIANE DAY
OIPE (703) 305-2868

NEW ATTORNEY/AGENT COPY

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
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APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
10/624,442	07/22/2003	Brian D. Morrison	CLK-002.03 (22046-203)

PEPE & HAZARD LLP
225 Asylum Street
Hartford, CT 06103

CONFIRMATION NO. 6413
OC000000014273683
OC000000014273683

Date Mailed: 11/03/2004

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 01/16/2004.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

MARIAN E DAY
OIPE (703) 305-2868

ATTORNEY/APPLICANT COPY

United States Patent and Trademark Office

Office of the Commissioner for Patents

EXHIBIT D

FAX

Date: 11-22-04

Number of pages including cover sheet: 3

To
Jan Narduzzi

For: 10/624,442

Phone

Fax phone: (216) 896-4027

CC:

From: Commissioner for Patents Office
Kathy Matecki
U.S. Patent & Trademark Office
Washington, DC 20231

Phone: (703) 305-8800

Fax phone: (703) 305-8825

REMARKS: ☐ Urgent ☐ Per your request ☐ Reply ASAP ☐ Please comment

Attached is the missing parts letter mailed on 12/2/03 in SN 10/624,442

Kathy Matecki

EXHIBIT D

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
10/624,442	07/22/2003	Brian D. Morrison	CLK-002.03 (22046-203)

CONFIRMATION NO. 6413

25181
FOLEY HOAG, LLP
PATENT GROUP, WORLD TRADE CENTER WEST
155 SEAPORT BLVD
BOSTON, MA 02110

FORMALITIES LETTER

"OC0000000011393829"

Date Mailed: 12/02/2003

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The statutory basic filing fee is missing.
  Applicant must submit $ 385 to complete the basic filing fee for a small entity.
- The oath or declaration is missing.
  A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.
- To avoid abandonment, a late filing fee or oath or declaration surcharge as set forth in 37 CFR 1.16(e) of $65 for a small entity in compliance with 37 CFR 1.27, must be submitted with the missing items identified in this letter.

The application is informal since it does not comply with the regulations for the reason(s) indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- A substitute specification in compliance with 37 CFR 1.52, 1.121(b)(3), and 1.125, is required. The specification, claims, or abstract page(s) submitted is not acceptable and cannot be scanned or properly stored because:
  - The line spacing on the specification, claims, or abstract is not 1½ or double spaced (see 37 CFR 1.52(b)).

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- Additional claim fees of **$117** as a small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due.

SUMMARY OF FEES DUE:

Total additional fee(s) required for this application is **$567** for a Small Entity

- **$385** Statutory basic filing fee.
- **$65** Late oath or declaration Surcharge.

- Total additional claim fee(s) for this application is **$117**

- **$117** for 13 total claims over 20.

Replies should be mailed to: Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

A copy of this notice MUST be returned with the reply.

T. Tran

Customer Service Center
Initial Patent Examination Division (703) 308-1202

PART 3 - OFFICE COPY

PATENT
ATTORNEY DOCKET NO: 07206/084001

COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled ELECTRO-STATICALLY SHIELDED PROCESSING MODULE, the specification of which was filed on June 11, 1999 as Application Serial No. 09/330,405.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose all information I know to be material to patentability in accordance with Title 37, Code of Federal Regulations, §1.56.

I hereby appoint the following attorneys and/or agents to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: Eric L. Prahl, Reg. No. 32,590; Gary A. Walpert, Reg. No. 26,098, Richard M. Sharkansky, Reg. No. 25,800; Andrew J. Rudd, Reg. No. 36,661; Shane H. Hunter, Reg. No. 41,858; Glenn H. Lenzen, Jr., Reg. No. 29,320; Robin R. Longo, Reg. No. 40,071; Deborah U. Verga, Reg. No. 38,351 and John W. Powell, Reg. No. 36,639.

Address all telephone calls to Richard M. Sharkansky at telephone number 617/542-5070.

Address all correspondence to Richard M. Sharkansky, Fish & Richardson P.C., 225 Franklin Street, Boston, MA 02110-2804.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patents issued thereon.

Full Name of Inventor: Brian D. Morrison

Inventor's Signature: Brian D Morrison Date: July 12 1999

Residence Address: 22 Piazza Lane, Hopkinton, MA 01748

Citizen of: United States of America

Post Office Address: Same As Above

Full Name of Inventor: Paul A. Connolly

Inventor's Signature: P A Connolly Date: 7-12-1999

Residence Address: 19 Jillson Circle, Milford, MA 01757

Citizen of: United Kingdom

Post Office Address: Same As Above

ELECTRO-STATICALLY- SHIELDED PROCESSING MODULE

Claim of Priority

[0001] This application is a continuation of U.S.S.N. 10/039,044 entitled "Electro-Statically-Shielded Processing Module," naming Brian D. Morrison and Paul A. Connolly as inventors, filed on January 3, 2002, now U.S. Patent No. 6,600,972, which is a continuation of U.S.S.N. 09/330,405 entitled "Electro-Statically Shielded Processing Module," naming Brian D. Morrison and Paul A. Connolly as inventors, filed on June 11, 1999, now U.S. Patent No. 6,356,809. The contents of these applications are hereby incorporated herein by reference in their entirety.

Background of the Invention

[0002] This invention relates generally to electronic packages and more particularly to packages adapted to house processing elements which are part of a distributed control system.

[0003] As is known in the art, a highly successive distributed control system is described in U.S. Patent Nos. 5,706,278, 5,809,220 and 5,796,935 all assigned to the same assignee as the present invention, the entire subject matter of each of such patents being incorporated herein by reference. Such patents describe, a fault tolerant distributed control system for sensing and control across a fault tolerant fiber optic communication media interconnecting a plurality of intelligent nodes. Each intelligent node comprises: a digital communication processor (DCCP) operating autonomously in relation to DCCPs at other nodes; and, a transceiver interfacing with the communication media. The fiber optic communication media comprises bi-directional serial data

busses. The combination provides a low cost, highly reliable distributed control system particularly applicable to primary and secondary aircraft control systems, as well as to other vehicle and control systems, for example.

[0004] As is also known in the art, the National Transportation and Safety Board (NTSB) and the Federal Aviation Agency (FAA) are becoming increasingly concerned about the amount of energy which can enter today's aircraft fuel tanks; whether as a designed level, or from externally coupled sources (e.g., lightening, surge, short-circuits, etc.). One of the primary reasons listed by the NTSB for the TWA Flight 800 explosion is electrical energy coupling in the fuel tank. Recent efforts to reduce this source of fuel explosion have focused on reducing the level of designed energy inside the tank; but, such efforts have faced a difficult task of quantifying and proving that unintended, or sneak, paths do not, and cannot exist. The failure hazards analysis is a long, and complex process.

Summary of the Invention

[0005] In accordance with the invention, a package is provided. The package includes an electro-statically shielded enclosure. A processor is disposed in the enclosure. A communication interface is provided for coupling data between the processor and a processor external to the package with such data passing through the enclosure. A power supply is provided for the processing element disposed in the enclosure. The power supply is adapted to generate power, for the processing element, in response to input energy. An energy interface is provided for coupling the input energy from a source external to the enclosure through a dielectric transmission media passing through the enclosure.

[0006] In one embodiment of the invention, the communication interface has a dielectric transmission media, for coupling data through the enclosure between the processor and a processor external to the enclosure, such media passing through the enclosure.

[0007] With such an arrangement both data to the electro-statically shielded processor and energy to the electro-statically shielded power supply are coupled to the electro-statically shielded enclosure through dielectric media. Therefore, electrical disturbances external to the enclosure will not be carried by conductive wires into the enclosure.

[0008] In one embodiment of the invention, a package is provided having an electro-statically shielded enclosure. A processor is disposed in the enclosure. A communication interface, having a dielectric transmission media, is provided for coupling data through the enclosure between the processor and a processor external to the enclosure, such media passing through the enclosure. A power supply for the processor is disposed in the enclosure, such power supply being adapted to generate power in response to input energy. An energy interface, having a dielectric transmission media, is provided for coupling the input energy from a source external to the enclosure through the dielectric transmission media of the energy interface, such energy interface dielectric transmission media passing through the enclosure.

[0009] In accordance with another embodiment of the invention, the communication interface has a fiber optic transmission media for coupling data between the processor and a processor external to the package through the fiber optic transmission media, such fiber optic transmission media passing through the enclosure.

The power supply for the processing element disposed in the enclosure comprising a photocell adapted to generate power for the processing element in response to light energy produced outside the enclosure. The energy interface has a fiber optic transmission media for coupling the light energy produced outside the enclosure through the energy interface fiber optic transmission media, such energy interface fiber optic transmission media passing through the enclosure.

[0010] In accordance with another embodiment of the invention, a fuel measuring system is provided. The fuel measuring system includes a package adapted for mounting to a fuel storage vessel. The package includes an electrostatically shielded enclosure. A processor element is disposed in the enclosure and is adapted for coupling to a fuel sensor disposed in the storage vessel. A communication interface is provided for coupling data through the enclosure between the processor and a processor external to the package through a dielectric transmission media passing through the enclosure. A power supply for the processor element disposed in the enclosure, such power supply-being adapted to generate power for the processing element in response to input energy. An energy interface is provided for coupling the input energy from a source external to the enclosure through dielectric transmission media passing through the enclosure.

[0011] With such an arrangement both data to the electro-statically shielded processor and energy to the electro-statically shielded power supply are coupled to the electro-statically shielded enclosure through dielectric media. Therefore, electrical disturbances external to the enclosure will not be carried by conductive wires into the enclosure and then into the fuel tank which might thereby ignite the fuel in the tank.

[0012] In one embodiment, the power supply comprises a fiber coupled photocell.

[0013] In accordance with yet another embodiment of the invention, a fuel monitoring system is provided. The system includes a plurality of fuel measuring systems, each one thereof having a package adapted for mounting to a corresponding one of a plurality of fuel storage vessels. Each one of the packages comprising: (i) an electro-statically shielded enclosure; (ii) a processing element disposed in the enclosure and adapted for coupling to a fuel sensor disposed in the storage vessel coupled thereto; (iii) a communication interface for coupling data through the enclosure between the processing element and a processing element external to the package through a dielectric transmission media passing through the enclosure; (iv) a power supply for the processing element disposed in the enclosure, such power supply being adapted to generate power for the processing element in response to input energy; and, (v) an energy interface for coupling the input energy from a source external to the enclosure through a dielectric transmission media passing through the enclosure. A distributed control system is provided for sensing and controlling the processing elements in the plurality of fuel gauges across a fault tolerant fiber optic communication media interconnecting the processing elements at each one of a plurality of nodes of the system. Each one of such nodes comprises the processing element. The processing element comprising a digital communication processing element adapted to operate autonomously in relation to the other processing elements at the other nodes and a communication interface comprising a transceiver interfacing with the communication media.

[0014] In one embodiment of the invention, the fiber optic communication media comprises bi-directional serial data busses.

Brief Description of the Drawing

[0015] FIG. 1 is a diagrammatical cut-away sketch of an aircraft having a fault tolerant distributed control system for sensing and control across fault tolerant fiber optic communication media interconnecting a plurality of intelligent nodes, a portion of such nodes monitoring fuel tanks in the aircraft, such portion of the nodes having electro-statically shielded enclosures for processing units used in such control system according to the invention;

[0016] FIG. 2 is a cross-sectional sketch of an exemplary one of the portion of the nodes used to monitor fuel in one of the tanks of the aircraft; and,

[0017] FIG. 3 is a diagram showing an arrangement of fuel tanks and nodes used to monitor fuel in different tanks of the aircraft.

Description of the Preferred Embodiments

[0018] Referring now to FIG. 1, an aircraft 10 is shown having a fault tolerant distributed control system 12 for sensing and control across fault tolerant fiber optic communication media 14 interconnecting a plurality of intelligent nodes 16. Each intelligent node 16 comprises: a digital communication processor and transceiver, hereinafter sometimes referred to as a processing module 18, operating autonomously in relation to modules 18 at other nodes 16. The transceiver in the module 18 is used for interfacing with the communication media 14. The fiber optic communication media 14 comprises bi-directional serial data busses, here fiber optic cables. The combination, described in the above referenced U. S. Patents, provides a low cost, highly reliable distributed control system particularly applicable to primary and secondary aircraft control systems. A plurality of the processing modules 18, here modules 18', is used to

monitor fuel in a corresponding one of the fuel tanks 20 of the aircraft. It should be understood, as described in the above referenced U. S. Patents, that the distributed local intelligent nodes are used to sense and/or control physical parameters of the fuel sensors with messages being passed across redundant serial buses whenever sense or control information changes. In order to achieve fault tolerant operation, two, three, four, or more redundant data buses may be employed depending upon the criticality. Redundancy is also employed in certain intelligent nodes performing critical functions such as sensor/actuator functions in an aircraft control system. The coupling of the nodes to the serial data buses is accomplished by transceivers within the modules 18 and each transceiver is connected to a digital control and communication processor (DCCP) within the module 18. Each combination of a transceiver and a DCCP may be referred to as a processing element or module. By distributing the system intelligence to every node, network communications is reduced, autonomy for failure-recovery is enhanced, and reliability is improved.

[0019] In an aircraft application of the control system 12, information flow between node computers can be minimized by distributing the control algorithms across the aircraft. It becomes possible to design a set of global data messages which pass across the communication network and correspond to aircraft state, physical parameters, and pilot commands. Individual nodes may subscribe to a given set of messages depending on the function they perform. For example, here, where fuel in each of the tanks is monitored a fuel availability computer would subscribe to messages indicating the fuel state of the aircraft while other processing units indicate the state of the fuel pumps, the state of the engine fuel flow, and whether the pilot has commanded fuel balancing, etc.

[0020] The control system 12 uses fiber optic communication media 14 as serial data buses which support multiple message transmitters. The bus network relies on a distributed media access technique to eliminate collisions, while at the same time not introducing any single points of failure. The advantages of a collision free network protocol are well known and are especially desirable for aircraft control systems or other critical control system applications.

[0021] The bus network supports bi-directional communications over a single fiber by restricting communications to half duplex. This has the obvious benefit of reducing the cost to interconnect processing nodes to a single fiber. Each processing module 18 has two bi-directional, half duplex ports. This allows large networks to be created by connecting together processing elements into rings. Each node within the network or ring is connected to its neighbors by a bi-directional, half-duplex point to point fiber link. As a message propagates around the network, the message is regenerated at each node 16. To prevent a single node or link failure from disabling the network, every message is transmitted across the ring in both directions and is removed from the ring by the node which receives it from both directions. This method of transmission guarantees the delivery of all messages to all operating nodes, in the event of single hardware failures or fiber breaks.

[0022] The control system 12 uses combinations of traditional fault tolerant techniques including hardware redundancy, software redundancy, temporal redundancy, and information redundancy. Flight critical functions are implemented using nodes composed of multiple processing elements. Hardware and software voters are utilized to ensure the validity of commands. Multiple, independent data buses are utilized to

ensure the validity of data. Asynchronous sampling techniques are used to reduce the effects of transient upsets or disturbances. Software design includes techniques such as recovery blocks and reasonableness checking known to those of ordinary skill in the art of software fault tolerance as described in the above-referenced U. S. Patents.

[0023] Referring to FIG. 2, an exemplary one of the fuel tanks 20 and a processing module 18' is shown. The processing module 18' includes a digital control and communication processor (DCCP) 28 and the transceiver 26. The DCCP 28 provides the network and applications-specific processing within a node to process inputs from sensors and control devices intelligently and propagate control information across a network 12 such as is shown in FIG. 1. The DCCP 28 comprises chip 50 (e.g., a VLSI chip) having three controllers 52 which include a media access control (MAC) processor, a network processor and an application processor; all three controllers 52 communicate on common address and data bus 60 to a random access memory (RAM) 56 and non-volatile, programmable read only memory (PROM) 58. The three controllers 52 are coupled to a network communication port 54 which interfaces with the single fiber controller 64 of transceiver 26. The transceiver 26 and in particular the deterministic controller 72 is connected to the bus 60 via a bus extension 62. The RAM 56 provides general purpose storage of network messages and program variables. The PROM 58 stores programs and configuration data for the three controllers 52, including a media access control system routine described hereinafter for initiating a priority or a non-priority message onto the network bus. The operation of the chip 50 is described in a Neuron Data Book dated February 1995 for the 3150 chip published by Echelon Corporation of Palo Alto, Calif. which is incorporated herein by reference. The chip 50

may be embodied by Part No. MC143150 manufactured by Motorola Inc. of Phoenix, Ariz or similar such chips. Other similar microcontrollers with network communication capabilities may also be used to implement the chip 50 or capabilities may be implemented using VHDL models which implement the necessary capabilities. The RAM may be embodied by Part No. CY7C199 manufactured by Cypress Semiconductor of San Jose, Calif.

[0024] Referring to FIGS. 1 and 2, the transceiver 26 receives and transmits data over the bi-directional data bus. Data packets from or to the fiber optic data bus are passed through bi-directional photo diodes 68, 70 which are coupled to a single fiber analog interface (SFAI) 66 or, alternatively, through separate transmit photo diodes and receive photo diodes or laser diodes which require two fiber optic cables between each node and dual fiber analog interfaces although two fiber optic cables are required. The uni-directional diodes are less costly. The SFAI 66 converts low level analog signals from the bi-directional photo diodes 68, 70 to CMOS or TTL levels and vice-versa. The bi-directional diodes 68, 70 function in a "ping-pong" mode whereby they operate as either a receiver or a transmitter. The photo-diodes 68, 70 may also operate uni-directional whereby the operation is receive only or transmit only. Providing support for two ping-pong diodes allows for data transfers to occur in different communication topologies, e.g. a ring or star configuration. The SFAI 66 provides for rapid packet mode response from a quiet network condition to packet detection and the SFAI 66 provides for minimal turn around time from transmit to receive mode or from receive to transmit mode. The SFAI 66 converts the inputs of the photo diodes 68, 70 to digital signals when in the receive mode and it converts digital signals to drive signals required by the bi-directional photo diodes 68, 70 in the transmit mode. The SFAI 66 may be embodied by Part No. G641848-3

manufactured by Raytheon Company of Marlborough, Mass. The bi-directional photo diodes 68, 70 may be embodied by Model lA2121-SMA2A manufactured by MITEL Semiconductor, the fiber optic data buses may be embodied by fiber optic cable such as Part No. BF04499 manufactured by Spectran Corp. of Avon, Conn. The SFAI 66 is connected to a single fiber controller (SFC) 64 which is connected to a deterministic controller (DC) 72. The SFC 64 interfaces with a communication port 54 of the DCCP 28 and the DC 72 interfaces with buses 60,62 of the DCCP 28. The combination of the SFC 64 and DC 72 is referred to as a single fiber controller-deterministic (SFC-D) 74. The SFC-D 74 communicates bi-directionally (half-duplex) via the fiber optic data buses. It provides the control for the operation of the deterministic network protocol including a contention type protocol_ of the DCCP 28.

[0025] Since the transceivers $26_{1\text{-}N}$ are operated in a circular or ring topology as shown in FIG. 1, the SFC 64 provides an anti-recirculation timer to automatically prevent data packets from being recirculated by deleting such data packets from the network once they are received at all nodes 16. The SFC 64 restores signal quality at each node 16 and provides for pulse width distortion compensation resulting from non-symmetrical high-to-low and low-to-high propagation delays. It also provides optical power monitoring by measuring the magnitude of pulse width distortion which provides a relative implication of optical power strength. The SFC 64 restores the signal pulse width before sending the signal to the DCCP 28 or re-transmitting the signal.

[0026] More particularly, and referring particularly to FIG. 2, an exemplary one of the fuel tanks 20 has disposed therein a fuel gauge 86. Here, for example, the fuel gauge 86 is a variable capacitance transducer, it being understood that an ultrasonic

transducer or similar means for measuring fuel levels. The variable capacitance gauge 86, for example, includes a pair of plates 88, or electrodes, separated a fixed distance by a dielectric, here the dielectric is the fuel 90 in the tank 20. Thus, as the level of the fuel 90 changes, the capacitance of the capacitive fuel gauge 86 changes. Consequently, a measure of the capacitance of the fuel gauge 86 provides a measure of the fuel 90 in the tank 20 when combined with information such as fuel density, temperature, etc. The capacitive fuel gauge 86 is connected by electrically conductive wires 87 passing through fuel tank 20 into a package 100 bolted to the fuel tank 20, as indicated. The package 100 is used to electro-statically shield: an analog to digital (A/D) converter, or frequency-to-digital converter, or similar such signal conversion device 102; the processing module 18' (i.e., the digital communication processor (DCCP) 28 and the transceiver 26 interfacing such module 18' with the communication media 14); a power monitor 105, and a power supply 104 for the module 18', signal converter 102, and power monitor 105. The signal converter 102, the digital communication processor (DCCP) 28 and the transceiver 26 , power monitor 105, and power supply 104, are mounted within the package 100 on one, or more electrically interconnected printed circuit boards, not shown. The signal converter 102 is used to convert the analog signal produced by the capacitive fuel gauge 86 into a corresponding digital signal for the DCCP 28. The DCCP 28 is used to sample the fuel quantity signal, average, calibrate, filter, and provide whatever signal processing is required right at the sampling fuel signal point.

[0027] The package 100 is an electro-static shielding enclosure which may be a conductor, such as a metal enclosure or a dielectric enclosure coated or clad with an electrical conductor to provide an electro-static enclosure for the signal conversion

device 102, the digital communication processor (DCCP) 28 and the transceiver 26, and other electrical components in the package 100. The package has an electrically conductive (i.e., electro-statically shielding) cover 101 attached to the top section 103 of the package. In addition to the processing module 18', the package 100 provides an electro-statically shielding enclosure to a power supply 104 and power monitor 105. The package 100 is provided with a data interface 108, here including a fiber optic connector 109 (such as that described in co-pending patent application entitled "Fiber Optic Connector", Serial No. 09/121,634, filed July 23, 1998, David Blake, Randolph Holtgrefe and Brian Morrison, assigned to the same assignee as the present invention, the entire subject matter thereof being incorporated herein by reference) for coupling data through the enclosure of package 100 to, and from, the processing module 18' through a dielectric (e.g., an electrical insulating) transmission media, here fiber optic connection media 14, here fiber optic cables passing through the package 100. The power supply 104, which here includes a solar, or photo cell 120 and DC/DC converter 107, is adapted to generate power, for the processing module 18' and other electronics in the package 100, in response to input energy, here laser, or light (i.e. optical) generated energy. An energy interface 110, here includes a fiber optic connector 111 similar to that used in the interface 108, is provided for coupling the laser energy from a laser source 122 (FIG. 1) external to the package 100 to the processing module 18' to the other electronics electro-statically shielded within the package 100. The energy interface 110 couples the energy from the source 122 (FIG. 1) to the power supply 104 through a dielectric transmission media, here a fiber optic cable 124 (FIGS. 1 and 2), passing through the enclosure of package 100. As noted above the package is bolted to the fuel tank 20, which tank 20 is aluminum, and hence is also electrically shielding, as indicated in FIG. 2.

[0028] Thus, the package 100 is provided with a pair of connectors 126, 127; connector 126 being mounted to the package 100 is used to mate with connector 127 mounted to the fuel tank 20 and which is electrically connected to the plates 88 of the capacitor fuel sensor 86. This first connector 126 is electrically connected to the signal conversion device 102, here producing a frequency related to the capacitance. Here, for example, the capacitor is serially connected to a resistor to provide an R-C network having a time constant which is the product of the fixed resistor and the capacitance which, as noted above, varies with the amount of fuel in the tank, it being understood that other means of interfacing a capacitance or ultra-sonic probe familiar to those skilled in the art may also be used. A series of pulses is fed to the R-C network an a threshold voltage is reached at times after the commencement of each pulse which is a function of the capacitance and hence the amount of fuel in the tank. Thus, the frequency produced by the signal conversion device 102 is related to the amount of fuel in the tank. This frequency is fed to the processor by electrical conductors between the first connector and the conductors of the printed circuit boards and to the processor. other devices, such as a modulator/demodulator of capacitance to frequency converter may also be used to convert the capacitance of the gauge to digital data.

[0029] In any event, the data to and from the processing module 18' is fed, via a second connector, here the data interfaces 108, which includes a pair of bi-directional photo diodes 68, 70. The light energy produced by the photo-diodes is coupled through fiber optic cables 14 via connectors, as shown. Thus, the transmission media 14 used for feeding data as modulated light energy into the processor transceiver and out of the processor via the transceiver is a dielectric media which inhibits electrical signals or

disturbances which may be generated externally of the package 100 from entering the electro-statically shielded package 100.

[0030] The power supply 104 for the electronics in the package 100 is generated from the photocell or laser energy power converter 120 which is illuminated by laser 122 (FIG. 1) energy introduced onto the photocell 120 via the fiber optic cable 124. It is noted that the cable 124 is a dielectric and thus maintains the electro-static shielding effect of the enclosure provided by the package 100. The power from the laser 122 is typically about one watt, or less. Therefore, with a 50% efficiency factor, about a half of a watt of power is generated within the package 100. The photocell produces about 1.2 volts per cell. Thus, serially connected 6 cells produces a voltage of about 7.2 volts. The voltage is regulated by the DC/DC converter 107 for the signal conversion device 102, processing module 18', and power monitor 105.

[0031] In the event of a failure, or reduction in light energy from the laser 122, there will be a reduction in the power generated by the photocell 120 and hence the amount of energy generated by the power monitor 105. The amount of power measured by the power monitor 105 is fed to the DCCP 28 and is transferred as data by the transceiver to the system 12 via the fiber optic cables 14. If the energy generated by the photocell falls below some threshold level, which may indicate a break, or leak, in the fiber optic cable 124 conveying the laser 122 energy to the photocell 120, it will be detected by one of the processing elements 18. Once detected, such processing element 18 provides a control signal to the laser 122 which is providing the energy source to the photocell 120 to turn such power laser 122 off. Similarly, for safety reasons, a node in a safe region of the aircraft continuously monitors the optical network messages, and, when

it sees a weak link developing, it turns off the laser source, thereby ensuring that a break in the fiber optic cable or a loose connection will not allow stray laser energy to impinge on any surface where such stray laser energy might cause an eye safety concern.

[0032] Referring now to FIG. 3, a typical arrangement is shown for an aircraft having left, right and center, and other, fuel tanks 20. Here, the packages 100 electro-statically shielding processing elements 18' are mounted to the fuel tanks, as described above in connection with FIG. 2 and here, have a pair of energy interfaces 110 for providing redundant photocells 120 instead of a single photocell. Here there are redundant lasers 122 each one connected to a different aircraft power bus. The data fiber optic cables 14 pass between the processing elements 18' and the optical network 12. Each laser source 122 has three fiber optic cables 124 for coupling the laser energy it produces to the three tanks 20, as indicated, for redundancy.

[0033] Other embodiments are within the spirit and scope of the appended claims.

CLAIMS

What is claimed is:

1. A system comprising;

an electro-statically shielded enclosure,

at least one processor disposed in the enclosure, and,

at least one dielectric media to couple at least one processor external to the enclosure and the at least one processor disposed in the enclosure.

2. A system according to claim 1, further including:

at least one energy source external to the enclosure,

at least one power supply disposed in the enclosure,

at least one dielectric media to couple the energy source external to the enclosure and the at least one power supply disposed in the enclosure.

3. A system according to claim 2, wherein the at least one power supply disposed in the enclosure is in communications with the at least one processor disposed in the enclosure.

4. A system according to claim 2, wherein the at least one energy source is a laser.

5. A system according to claim 2, wherein the at least one power supply disposed in the enclosure is a laser energy power converter.

6. A system according to claim 2, wherein the at least one dielectric media to couple the at least one energy source external to the enclosure and the at least one power supply disposed in the enclosure includes a fiber optic cable.

7. A system according to claim 1, wherein the at least one dielectric media to couple the at least one processor external to the enclosure and the at least one processor disposed in the enclosure includes a fiber optic cable.

8. A system according to claim 1, wherein the at least one processor disposed in the enclosure includes at least one of a media access controller, a network processor, and an applications processor.

9. A system according to claim 1, further including a transceiver disposed in the enclosure, the transceiver in communications with the at least one processor disposed in the enclosure.

10. A system according to claim 1, further including at least one photo-diode to interface between the at least one processor external to the enclosure and the at least one processor disposed in the enclosure.

11. A system according to claim 2, further including a power monitor disposed in the enclosure, the power monitor in communications with the at least one processor disposed in the enclosure, and the power monitor in communications with the power supply disposed in the enclosure.

12. A system according to claim 1, further including a first connector and a second connector, wherein the first connector and the second connector are mated, and wherein the first connector is mounted to the enclosure, and the second connector is mounted external to the enclosure to provide an electrical connection to a sensor.

13. A system according to claim 12, wherein the second connector is mounted to a fuel tank, and the sensor is a fuel sensor.

14. A system according to claim 12, wherein the first connector is in communications with the at lease one processor disposed in the enclosure.

15. A system for measuring fuel, the system comprising:

an electro-statically shielded enclosure,

at least one processor disposed in the enclosure,

a fuel tank, and ,

a fuel sensor in communications with the fuel tank and the at least one processor disposed in the enclosure.

16. A system according to claim 15, further including:

a first connector mounted to the enclosure and in communications with the at least one processor disposed in the enclosure, and,

a second connector mounted to the fuel tank, the second connector mated to the first connector, the second connector in communications with the fuel sensor, and,

17. A system according to claim 15, wherein the fuel tank is an aluminum fuel tank.

18. A system according to claim 15, wherein the fuel sensor includes a variable capacitance transducer.

19. A system according to claim 15, further including at least one power supply disposed in the enclosure.

20. A system according to claim 15, further including a signal conversion device to accept an input from the first connector and provide an output to the at least one processor disposed in the enclosure.

21. A system according to claim 15, further including:

at least one processor external to the enclosure, and,

at least one dielectric media to couple the processor external to the enclosure and the at least one processor disposed in the enclosure.

22. A system according to claim 15, further including:

at least one energy source external to the enclosure,

at least one power supply disposed in the enclosure,

at least one dielectric media to couple the at least one energy source external to the enclosure and the at least one power supply disposed in the enclosure.

23. A system according to claim 22, wherein the energy source is a laser.

24. A system according to claim 22, wherein the at least one power supply disposed in the enclosure is a laser energy power converter.

25. A system according to claim 22, wherein the at least one dielectric media to couple the at least one energy source and the at least one power supply disposed in the enclosure includes a fiber optic cable.

26. A system according to claim 21, wherein the at least one dielectric media to couple the at least one processor and the at least one processor disposed in the enclosure includes a fiber optic cable.

27. A system according to claim 15, wherein the enclosure is mounted to the fuel tank.

28. A method for providing a measurement from a fuel tank, the method comprising:

providing an electro-statically shielded enclosure including at least one processor disposed in the enclosure.

providing at least one power supply disposed in the enclosure, the at least one power supply in communications with the at least one processor disposed in the enclosure, and,

providing at least one dielectric media to couple the at least one energy source and the at least one power supply disposed in the enclosure.

29. A method according to claim 28, further including:

providing at least one energy source external to the enclosure,

providing at least one power supply disposed in the enclosure, the at least one power supply in communications with the at least one processor disposed in the enclosure, and,

providing at least one dielectric media to couple the at least one energy source and the at least one power supply disposed in the enclosure.

30. A method according to claim 28, wherein providing at least one dielectric media to couple the at least one external to the enclosure and the at least one processor disposed in the enclosure includes providing a fiber optic cable.

31. A method according to claim 29, wherein providing at least one dielectric media to couple the at least one energy source and the at least one power supply disposed in the enclosure includes providing a fiber optic cable.

32. A method according to claim 28, wherein providing a fuel tank sensor in communications with the fuel tank and the at least one processor disposed in the enclosure, includes:

providing a first connector mounted to the enclosure and in communication with the at least one processor disposed in the enclosure,

providing a second connector mounted to the fuel tank, the second connector in communications with the fuel tank sensor and the second connector mated to the first connector.

33. A method according to claim 29, further including providing a power monitor in communications with the at least one power supply and the at least one processor disposed in the enclosure.

Abstract

A fuel measuring system includes a package adapted for mounting to a fuel storage vessel. The package includes an electro-statically shielded enclosure. A processor element is disposed in the enclosure and is adapted for coupling to a fuel sensor disposed in the storage vessel. A communication interface is provided for coupling data through the enclosure between the processor and a processor external to the package through a dielectric transmission media passing through the enclosure. A power supply for the processor element disposed in the enclosure, such power supply being adapted to generate power for the processing element in response to input energy. An energy interface is provided for coupling the input energy from a source external to the enclosure through dielectric transmission media passing through the enclosure. With such an arrangement both data to the electro-statically shielded processor and energy to the electro-statically shielded power supply are coupled to the electro-statically shielded enclosure through dielectric media. Therefore, electrical disturbances external to the enclosure will not be carried by conductive wires into the enclosure and then into the fuel tank which might thereby cause a hazardous condition in the fuel in the tank.

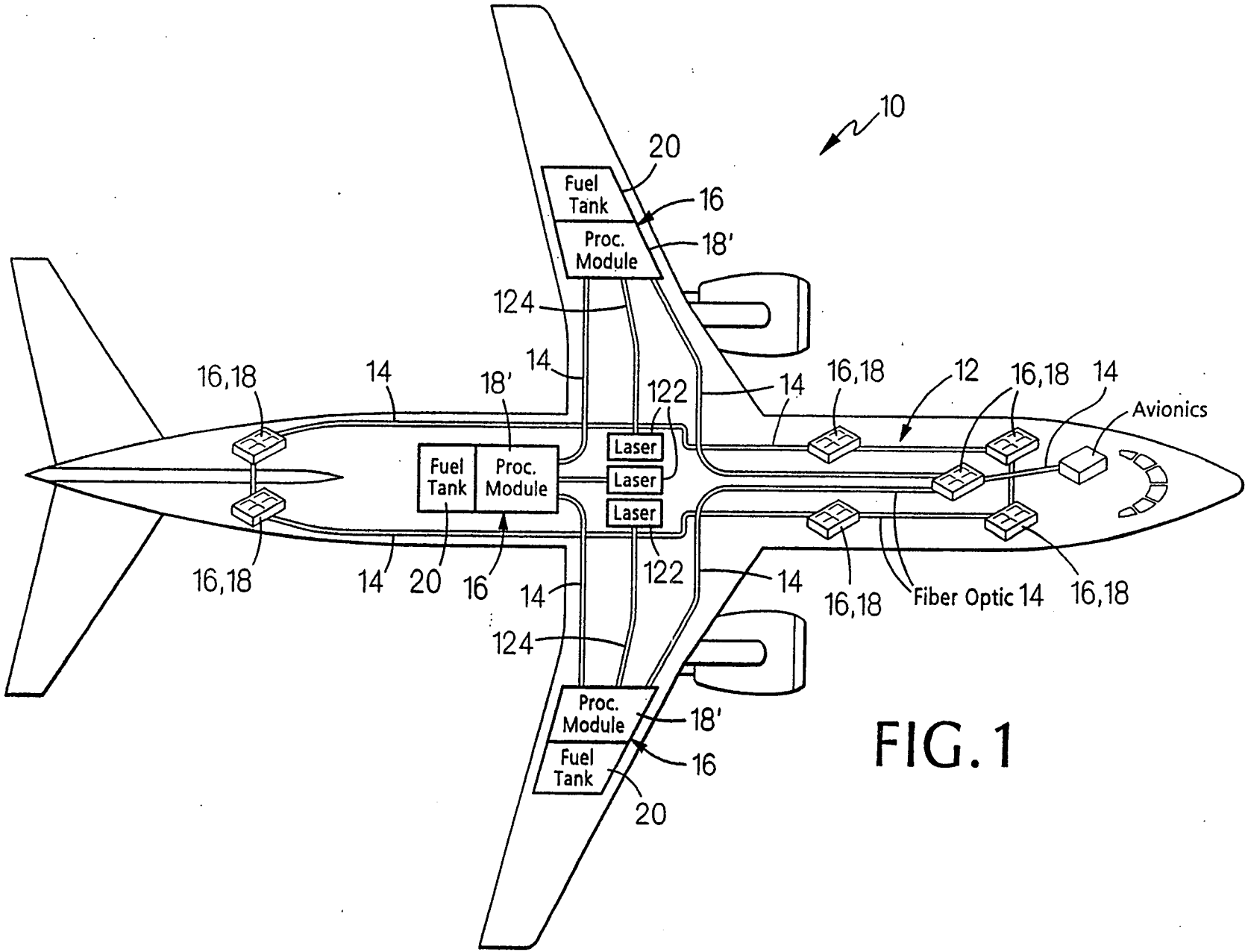
10
20
Fuel Tank
16
Proc. Module
18'
124
14
16,18
14
18'
14
122
14
16,18
12
16,18
14
Avionics
Laser
Laser
Laser
Fuel Tank
Proc. Module
16,18
14
20
16
14
122
14
16,18
Fiber Optic 14
16,18
124
Proc. Module
18'
Fuel Tank
16
20

FIG. 1

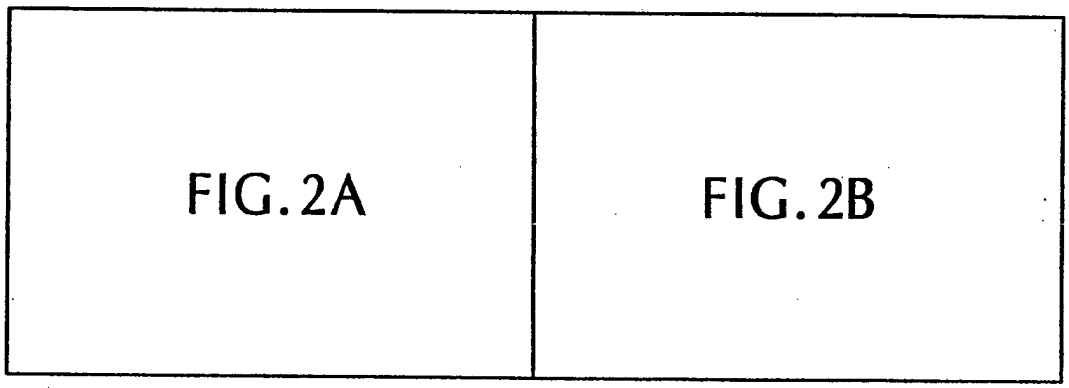

FIG. 2

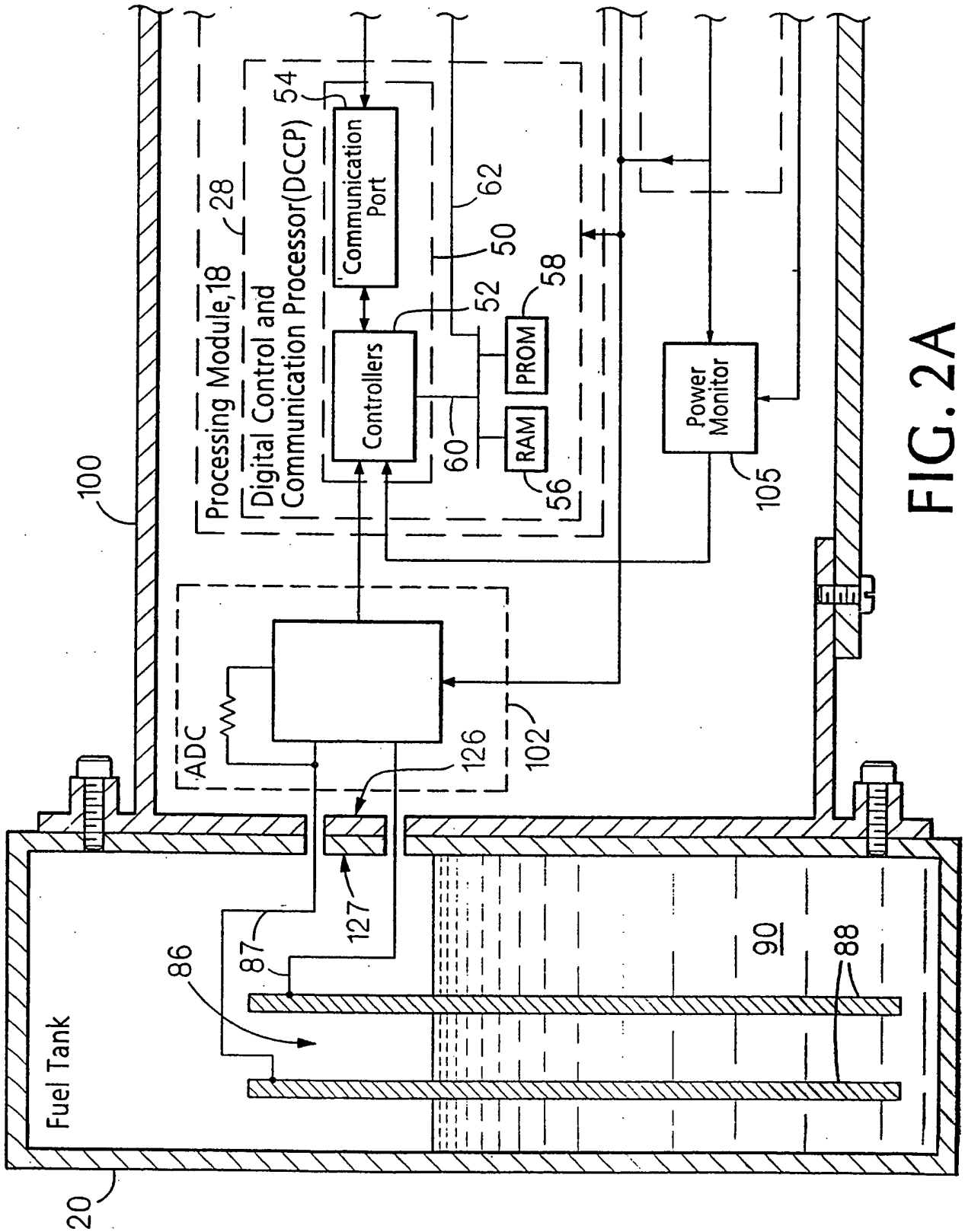
Processing Module,18
28
Digital Control and
Communication Processor(DCCP)
54
Communication Port
62
50
52
58
Controllers
PROM
RAM
60
56
Power Monitor
105
100
ADC
126
102
127
86
87
90
88
Fuel Tank
20

FIG. 2A

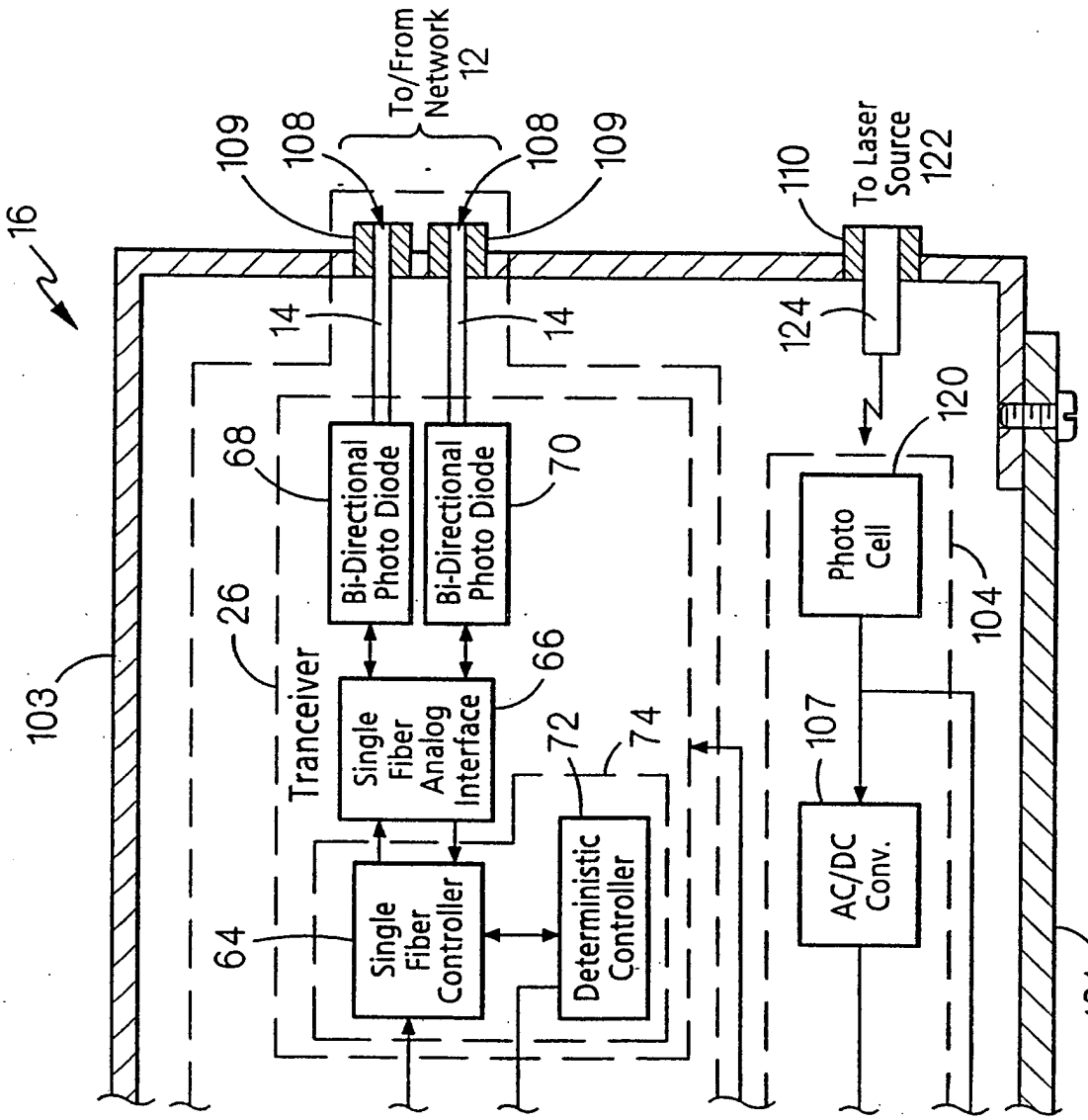
16
103
109
108
To/From Network 12
108
109
110
To Laser Source 122
14
14
124
120
68
Bi-Directional Photo Diode
70
Bi-Directional Photo Diode
Photo Cell
104
26
Tranceiver
66
Single Fiber Analog Interface
72
74
107
64
Single Fiber Controller
Deterministic Controller
AC/DC Conv.
101

FIG. 2B

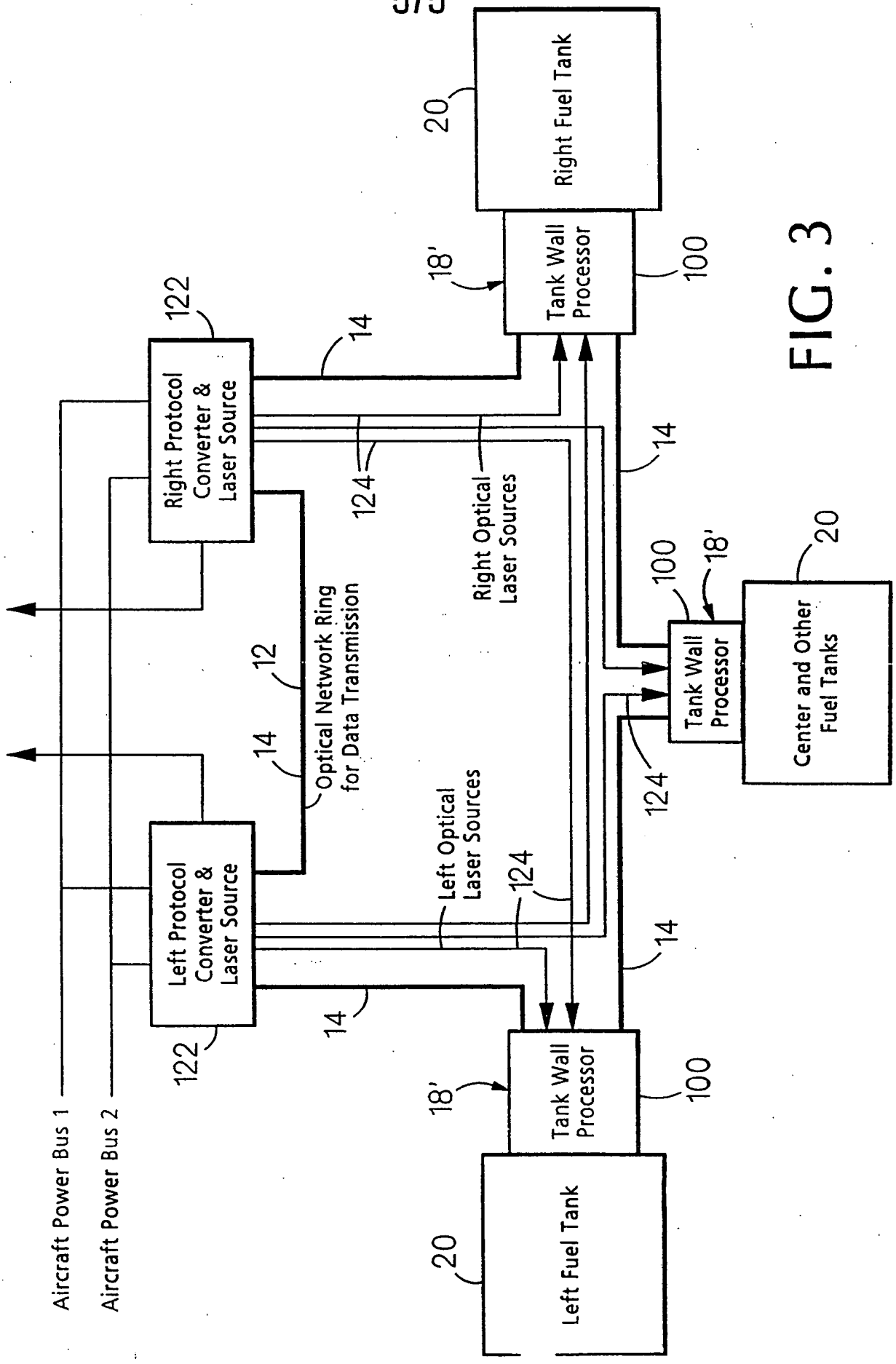
Aircraft Power Bus 1
Aircraft Power Bus 2
Left Protocol Converter & Laser Source
Right Protocol Converter & Laser Source
Optical Network Ring for Data Transmission
Left Optical Laser Sources
Right Optical Laser Sources
Tank Wall Processor
Left Fuel Tank
Right Fuel Tank
Center and Other Fuel Tanks
12
14
18'
20
100
122
124

FIG. 3